

Phylum **Xenacoelomorpha**^{1,2} Philippe et al. 2011 (2 subphyla)

Subphylum **Xenoturbellida** Westblad, 1949 (1 family)

Family **Xenoturbellidae** Westblad, 1949 (1 genus, 2 species)

Subphylum **Acoelomorpha**³ Ehlers, 1985 (2 classes)

Class **Nemertodermatida**⁴ Karling, 1940 (2 families)

Family **Ascopariidae** Sterrer, 1998 (2 genera, 4 species)

Family **Nemertodermatidae** Steinböck, 1930 (4 genera, 5 species)

Class **Acoela**⁵ Uljanin, 1870 (16 families)

Family **Diopisthoporidae** Westblad, 1940 (1 genus, 5 species)

clade **Bitesticulata** Jondelius, Wallberg, Hooge, and Raikova, 2011

Family **Paratomellidae** Dörjes, 1966 (2 genera, 3 species)

clade **Bursalia** Jondelius, Wallberg, Hooge, and Raikova, 2011

clade **Prosopharyngida** Jondelius, Wallberg, Hooge, and Raikova, 2011

Family **Hallangiidae** Westblad, 1946 (2 genera, 2 species)

Family **Hofsteniidae** Bock, 1923 (3 genera, 6 species)

Family **Solenofilomorphidae** Dörjes, 1968 (5 genera, 10 species)

clade **Crucimusculata** Jondelius, Wallberg, Hooge, and Raikova, 2011

Family **Dakuidae** Hooge, 2003 (3 genera, 21 species)

Family **Isodiametridae** Hooge and Tyler, 2005 (22 genera, 90 species)

Family **Otocelididae** Westblad, 1948 (5 genera, 9 species)

Family **Proporidae** Gra?, 1882 (14 genera, 62 species)

clade **Aberrantospermata** Jondelius, Wallberg, Hooge, and Raikova, 2011

Family **Convolutidae** Gra?, 1905 (24 genera, 114 species)

Family **Mecynostomidae** Dörjes, 1968 (11 genera, 32 species)

Family *incertae sedis* **Actinoposthiidae** Hooge, 2001 (10 genera, 22 species)

Family *incertae sedis* **Antigonariidae** Dörjes, 1968 (1 genus, 1 species)

Family *incertae sedis* **Antroposthiidae** Faubel, 1976 (3 genera, 3 species)

Family *incertae sedis* **Nadinidae** Dörjes, 1968 (1 genus, 3 species)

Family *incertae sedis* **Tauridae** Kostenko, 1989 (1 genus, 1 species)

References cited

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Egger, B., Steinke, D., Tarui, H., De Mulder, K., Arendt, D., Borgonie, G., Funayama, N., Gschwentner, R., Hartenstein, V., Hobmayer, B., Hooge, M., Hrouda, M., Ishida, S., Kobayashi, C., Kuales, G., Nishimura, O., Pfister, D., Rieger, R., Salvenmoser, W., Smith, J., Technau, U., Tyler, S., Agata, K., Salzburger, W., & Ladurner, P. (2009) To be or not to be a flatworm: The acoel controversy. *PLoS ONE* 4(5): e5502. doi:10.1371/journal.pone.0005502.

Franzén, A. & Afzelius, B.A. (1987) The ciliated epidermis of *Xenoturbella bocki* (Platyhelminthes, Xenoturbellida) with some phylogenetic considerations. *Zoologica Scripta*, 16, 9–17.

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1. BY Seth Tyler and Stephen Schilling (For full authors' address, see after References Cited.) The title of this contribution should be cited as “Phylum Xenacoelomorpha Philippe, et al., 2011. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness”. At the time this was compiled, the Xenacoelomorpha comprised 2 subphyla, 2 classes, 19 families, 115 genera, and 395 species. These are taxa formerly classified in the Class Turbellaria of the Platyhelminthes, which is now recognized to be paraphyletic and polyphyletic. (See also: <http://turbellaria.umaine.edu>)
2. Both molecular and ultrastructural data tie *Xenoturbella* to the Acoelomorpha (see Franzén and Afzelius 1987, Lundin 1998, Philippe et al. 2011), and because of the long-recognized deuterostomian characters of *Xenoturbella* (Reisinger 1960, Bourlat et al. 2003, Telford 2008), placing the Acoelomorpha, as well, in the Deuterostomia or as sister group to it has been a possibility (Tyler, 2001). The most recent genomic phylogeny (Philippe et al. 2011) ties *Xenoturbella* and Acoelomorpha as sister groups composing the clade Xenacoelomorpha, which is ranked as a phylum of Deuterostomia, sister group to the Ambulacraria (phyla Echinodermata and Hemichordata); Xenacoelomorpha + Ambulacraria are together sister group to the phylum Chordata.
3. The relationship of the Acoelomorpha to the phylum Platyhelminthes is a matter of controversy (Egger et al. 2009). A strong morphological character, in the nature of stem cells, unites Acoelomorpha and Platyhelminthes, but molecular phylogenies—whether from just a single molecule, such as 18S rDNA (Ruiz-Trillo et al. 1999), or from larger datasets on a genomic scale (Philippe et al. 2011)—place the Acoelomorpha outside of the Platyhelminthes. That phylum occupies an uncertain position in the Lophotrochozoa (see Giribet 2008).
4. Sterrer (1998)
5. Classification following Dörjes (1968), Hooge et al. (2002), Jondelius et al. (2011)

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Hooge MD, Haye P, Tyler S, Litvaitis MK, & Kornfield I 2002 Molecular systematics of the Acoela (Platyhelminthes) and its concordance with morphology. *Molecular Phylogeny and Evolution*, 24, 333–342.

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